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AUTHOR Visscher, Adrie J.; Bos, Klaas Tj.
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ABSTRACT

Findings of a study that examined the effect of a computer-assisted absence registration system (ARS) on student truancy are presented in this paper. A pre- and post-test group design compared the truancy levels of 30 secondary schools in 4 large cities in western Holland who participated in the ARS program with those of 19 nonparticipating secondary schools. Other data were derived from interviews with and questionnaires filled out by teachers, principals, clerical staff, and the school ARS coordinator. Findings suggest that ARS did not significantly reduce absenteeism rates and that, after 20 months, the factors that influenced school motivation to use ARS and create a conducive school environment dissipated. No predictors were found for the development of antitruancy measures. Despite the system's failure to significantly reduce truancy, staff at the project schools reported some positive effects, such as time reduction, more efficient registration and handling of absences, and identification of attendance trends. One figure and seven tables are included. (Contains 11 references.) (LMI)

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COMBATING TRUANCY: CAN THE COMPUTER HELP SCHOOLS?

Adrie J. Visscher & Klaas Tj. Bos

Department of Education, University of Twente, P.O. Box 217, 7500 AE Enschede, the Netherlands

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Abstract

The main question this paper reports on is to what degree truancy can be reduced by means of a computer-assisted absence registration system (ARS). This question has been answered in a quasi-experimental study with a pre-test post-test, control group design. Regarding the central research question, this paper also reports on the extent to which schools use the system, the factors that stimulate system use and positive and negative effects of ARS use other than possible changes in absenteeism rates. The introduction and use of ARS has been studied between 1988 and 1991. Data analysis shows that no significant reduction of absenteeism rates was achieved in schools that use ARS. This might be related to the fact that ARS was mainly used for daily absence registration, whereas analytical usage and the development of anti-truancy measures on the basis of ARS-data have been developed only to a very limited degree. The extent to which schools are motivated to use ARS and the degree to which they meet certain conditions that are positive for ARS use prove to be predictors for registrational ARS use during the first phase of the innovation process. However, when ARS is used for about 20 months the influence of these factors disappears. No predictors were found for the development of anti-truancy measures on the basis of ARS-output, which probably is because anti-truancy measures were developed to a very small degree and almost did not vary between schools.

Although truancy was not reduced significantly as a result of introducing ARS, staff at project schools perceived quite a number of strong positive effects of ARS use. Most of these effects concern aspects of registering and handling student absences better; a few are related to a reduction in the time required for combating absenteeism. On the other hand school staff did not mention any serious negative effects.

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Introduction

ARS is an acronym for Absence Registration System, a computer-assisted system that supports the registration of absent students as well as the analysis of absence data. The design and development of the system resulted from an initiative by the Dutch government, which was looking for a means to reduce absenteeism and therefore started a project in 1988 with thirty secondary schools in four large cities in western Holland. Project schools received ARS hardware and software, as well as support when implementing the system in their school. In exchange for these facilities schools had to collaborate in a research project intended to evaluate the introduction and effects of ARS. The aim of the project was to investigate whether the computer can help schools to reduce absenteeism. For several reasons it was hoped that it would be possible. Firstly, the ARS procedure for registering and handling absent students is systematic and, if carried out correctly, enables the detection of absent students. ARS produces so-called absence control lists that contain all students that have been absent without a reason that is regarded as valid by the school. Absence control lists are used to determine reasons for absence of one or more individual truants (valid reasons or not). When the reason for a student's absence is known, an absence handler (e.g. a tutor) can decide if measures against that student (punishment, counselling etc.) should be taken.

A second reason for the expected reduction of truancy concerns the statistical reports ARS can produce, which can assist schools to discover absenteeism patterns, such as relations between absenteeism rates and other variables (e.g. subjects, teachers and timetable characteristics). On the basis of this information schools can develop an anti-truancy policy; that is apply general measures for the whole school that are meant to reduce the extent of truancy.

Thus, it is expected that the ARS-procedure and the use of absence control lists will enable truants to be better detected than when registration and handling are done manually. Measures against individual truants will hopefully reduce absenteeism by discouraging them to play truant. Moreover, information on the relation between truancy and other variables and on truancy patterns will hopefully lead to the development of general anti-truancy measures by schools that will reduce truancy by eliminating some of the causes.

Research questions and research framework

The central research questions of this project are:

1. To what degree is ARS used by project schools?
2. To what extent did absenteeism rates change in experimental and in control schools between 1988 and 1991?
3. What factors stimulate a successful implementation of ARS?
4. Did the use of ARS bring about some other effects other than any changes in absenteeism rates?

To answer these questions a theoretical framework has been constructed and is now presented. Very little systematic knowledge exists regarding the role that various variables play in implementing computer-assisted school information systems (see e.g. Kwon & Zmud, 1987; Keen, 1981). Because no accepted theoretical framework is available, relevant variables have been identified by means of literature research.
Research literature from the fields of educational innovation, business administration and computer science was analysed concerning the development and use of information systems (IS), and the implementation of school information systems. Although some variation exists between the clusters of variables that various authors (see Fullan, 1982; Rogers, 1983; Mayntz, 1984; Stasz Bikson & Shapiro, 1986, Björn-Andersen et al.,1986) distinguish with regard to educational innovation, the following groups of variables are mentioned most frequently:

1. the characteristics of the innovation contents;
2. the characteristics of the innovating unit;
3. the innovation strategy used.

These three clusters of variables are also considered to be important for studying the introduction and use of ARS. As far as the first group of variables is concerned, the quality of the innovation (in our case ARS) seems to be especially valuable. The results of the implementation process are probably also dependent on the characteristics of the innovating units (in our case schools) and of the type of strategy used to implement the innovation. Especially following Björn-Andersen (1986), Rogers (1983) and Mayntz (1984), it is assumed in this project that the impact of introducing computer-assisted school information systems is determined by how the IS has been designed (block A in Figure 1) and how it is used (block D).

Figure 1 shows the groups of variables that are studied in this research project and their mutual relations. As explained in the introduction it is hoped that the use of ARS will lead to a reduction in the number of truants. Therefore block E contains the main effect variables, the absenteeism rates (E1 to E4 in Figure 1).

Two forms of absenteeism are distinguished in this paper. The first is disallowed absence, which is the same as truancy and the other is allowed absence. Disallowed absence is defined as absent without a reason considered valid by the school, while allowed absence is defined as being absent during a lesson with a reason regarded as valid by the school. E1 refers to the degree of allowed absence at school level, whereas the extent of disallowed absence/truancy is expressed by variable E2. Variable E3 shows the percentage of truants that play truant 1-2, 3-5, or 6-8 lessons respectively on a specific school day. The truancy ratio (E4) expresses the percentage of students of a school truanting for one or more lessons on the monitored day.

Since installing and using computers often goes hand-in-hand with unplanned positive and/or negative effects, the degree to which such effects occur is also determined (see E5 to E19 in figure 1).

Figure 1 assumes that Block E is influenced by the use of ARS (see block D), that is, the frequency with which ARS is used in certain ways. Three forms of ARS use are distinguished:

- registrational: registering daily absence, that is, entry of absence data and retrieval of absence control reports containing daily absences (D1);
- analytical: retrieval of statistics over long periods to find absence patterns and relations between absenteeism rates and other variables like subjects, teachers etc. (D2).

Moreover, a school can develop an anti-truancy policy on the basis of ARS data (D3 in Figure 1) and as such try to reduce absenteeism.

ARS use is assumed to be influenced by the quality of the innovation (block B), by characteristics of the implementation process and school characteristics (block C). It is assumed the higher the innovation quality perception of a school, and the more the implementation process characteristics promote ARS (block C1), the more intense will be the use of ARS probably in that school. Moreover, it is expected that certain school characteristics will promote ARS use (block C2). For instance the attitude of staff towards ARS (variable C2.1 in figure 1) or the similarity between ARS and the procedure of absence registration already used by the school (C2.3).

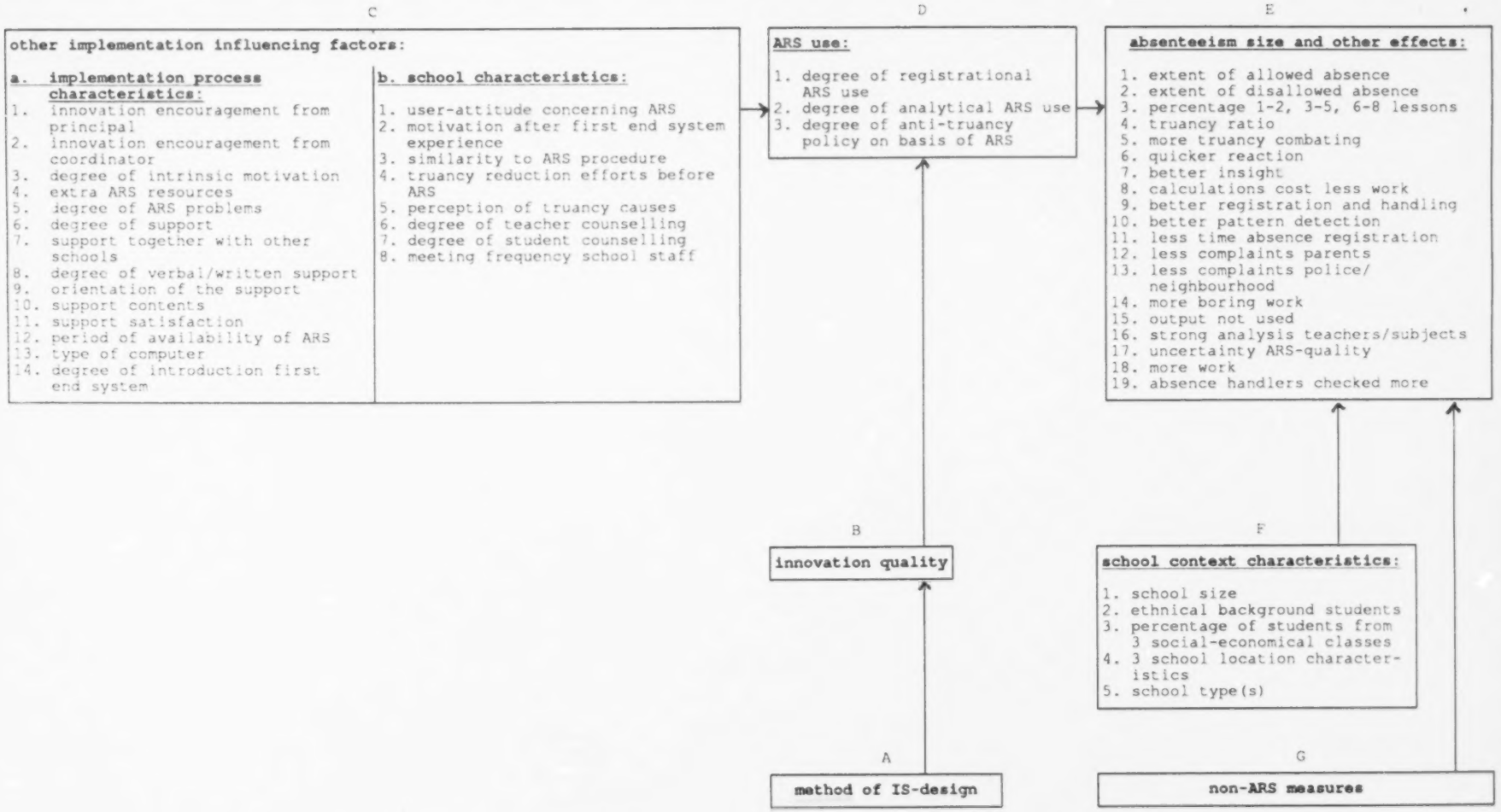
C
other implementation influencing factors:
a. implementation process characteristics:
1. innovation encouragement from principal
2. innovation encouragement from coordinator
3. degree of intrinsic motivation
4. extra ARS resources
5. degree of ARS problems
6. degree of support
7. support together with other schools
8. degree of verbal/written support
9. orientation of the support
10. support contents
11. support satisfaction
12. period of availability of ARS
13. type of computer
14. degree of introduction first end system
b. school characteristics:
1. user-attitude concerning ARS
2. motivation after first end system experience
3. similarity to ARS procedure
4. truancy reduction efforts before ARS
5. perception of truancy causes
6. degree of teacher counselling
7. degree of student counselling
8. meeting frequency school staff
D
ARS use:
1. degree of registrational ARS use
2. degree of analytical ARS use
3. degree of anti-truancy policy on basis of ARS
E
absenteeism size and other effects:
1. extent of allowed absence
2. extent of disallowed absence
3. percentage 1-2, 3-5, 6-8 lessons
4. truancy ratio
5. more truancy combating
6. quicker reaction
7. better insight
8. calculations cost less work
9. better registration and handling
10. better pattern detection
11. less time absence registration
12. less complaints parents
13. less complaints police/ neighbourhood
14. more boring work
15. output not used
16. strong analysis teachers/subjects
17. uncertainty ARS-quality
18. more work
19. absence handlers checked more
B
innovation quality
F
school context characteristics:
1. school size
2. ethnical background students
3. percentage of students from 3 social-economical classes
4. 3 school location characteristics
5. school type(s)
A
method of IS-design
G
non-ARS measures

Figure 1: The framework for the ARS evaluation study

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Block F and G represent two variable blocks that might influence the primary effect variables, the absenteeism rates. In case of a reduction of absenteeism rates, context variables like school size, the socio-economic and ethnic background of students are expected to be related to truancy, and their influence must be controlled for (Bos, Ruijters & Visscher, 1990). The same goes for variable G: truancy reducing measures that have been taken by schools since 1988 but which are not based on the use of ARS. The relation between these 'other measures' and trends in absenteeism should be studied.
Block A represents the method used to design and develop ARS. Since ARS has been designed in one way only, the design method is not a variable studied in tnis investigation.

Problems with ARS and their impact

The University of Twente in the Netherlands designed an ARS prototype that was tested intensively until a stable prototype was available. A software company was then asked to transform the prototype into a so-called 'end system', which can be used by any school without intensive support. When the end system was ready (April 1988) it was installed and used in the project schools. Unfortunately the quality of the produced end system (the first version of the ARS end system) did not meet requirements and another software company built a second end system that was introduced and used in ARS schools in September 1989. However, the fact that project schools between April 1988 and September 1989 had worked with the first, imperfect end system and had had many negative experiences of it is of importance for it is likely that the large number of problems these schools had already encountered influenced their motivation for using ARS considerably.
For this reason project schools were studied in the period between the failed introduction of the first end system and the moment at which the second end system was installed. In that period the degree to which each school used the first, imperfect end system (C 1.14) was studied, as well as the level of motivation for the ARS innovation after the experiences with the first ARS end system (C 2.2), in order to determine the relation between these variables and the extent to which the second version of ARS was used.

Method

Experimental group, control group and research design

In order to answer the research questions, data was collected in thirty secondary schools that voluntarily participated in the ARS project. The Dutch government wanted four large cities (Amsterdam, Rotterdam, Utrecht and Haarlem) to participate since it assumed that truancy

was a big problem there. The four cities were asked to select schools in their borough that were willing to participate in the project. Project schools were probably motivated to participate because of a possible reduction in truancy and/or for the resources they received (hardware, software, support etc.). Therefore the research group is select and the findings of this investigation cannot be generalized statistically.

The study has a quasi-experimental design with a pre-test and two post-tests. The degree of absenteeism was initially determined before ARS was introduced in April 1988. The second measurement of absenteeism was carried out in April 1990, when ARS had been used for 8 months. In April 1991 (schools had been using ARS for 20 months) absenteeism was measured for the last time. Data regarding the other variable blocks in Figure 1 were also collected at these same moments in time.

Besides the project schools a group of 19 control schools were involved in the study. On each of the above mentioned moments of data collection, absenteeism rates and some organization and context characteristics of the control schools were determined. This enables an analysis to be made of developments in absenteeism rates if ARS is not used (i.e. in control schools) and might prevent changes in truancy rates being attributed mistakenly to the use of ARS.

The control schools were selected on the basis of 4 criteria:

- location (in one of the large cities in western Holland: Rotterdam, Utrecht, The Hague);
- school size: four categories were distinguished, 0-300, 301-500, 501-750 and 751 or more students;
- school type: 6 school types were distinguished (e.g. schools for lower vocational education or a school with a combination of various school types);
- no computer-assisted absence registration system in use.

The project schools were categorized according to the first three criteria and an attempt was made to find at least one comparative control school for each type of project school. Complying with the 'location' criterion was very difficult. Schools in Amsterdam could not be contacted because of participating in other research projects and as a result schools in The Hague were used.

The problem in realizing a control group is that the willingness of schools to participate in the project is very limited since the pay off for them is zero and participation demands time and effort. As many schools as possible (42 schools) were approached, 19 of them were suitable and willing to act as a control school.

Without doubt there is no perfect match between control and project schools. Some combinations of school types that exists in the project group do not exist in the control group

and vice versa. Moreover, the number of control schools (19) is smaller than the number of project schools and none of the control schools is located in Amsterdam. So, comparing the results of project and control schools should be done carefully.

Procedure and instruments

Absenteeism data were gathered in the experimental and in the control schools during one day in April 1988, 1990 and 1991 during all lessons (e.g. about 6000 lessons in 1988), except those given over to examination (highest grade) classes. The goal was to evaluate whether schools with a certain number of absent students could reduce their number if they used ARS. Therefore the degree of absenteeism at school level was computed and characteristics of individual absent students were not measured.

Data on the other variables in block B to G were collected by means of structured interviews and questionnaires with principals, clerical staff, teachers and the internal ARS coordinator of each school.

Data processing and analysis

Data processing resulted at first in descriptive statistics (cross tabs, frequencies) and association measures such as Pearsons Product Moment correlations. To be able to determine to what degree changes in school absence rates (between 1988, 1990 and 1991) differ between project and control schools, Mann-Whitney tests were carried out concerning these changes. This was only carried out on the data of those schools of which all required data were available. This meant that data of 22 ARS-schools and of 17 control schools could be used. Moreover, regression analysis was used to determine predictors for ARS use. To determine if changes concerning a variable (e.g. changes in analytical ARS use) between two years are statistically significant, these differences have been tested by means of the Wilcoxon-test for matched pairs.

Data of 30 (1990) and 27 (1991) project schools could be used to answer the fourth research question (other effects of ARS use).

Results

The four research questions will be answered subsequently.

The use of ARS

The first research question concerns the degree to which ARS is used. The study of registrational ARS use, analytical use of ARS and the use of ARS-output for the development of an anti-truancy policy during the school years 1989-1990 and 1990-1991 produced the following picture. Registrational ARS use (registering absence daily, retrieving absence control lists and handling absence on the basis of these lists) developed mainly in the project schools. A relatively small number of schools use this ARS for analytical and for policy-making purposes and where they do, this is not done very intensely. In both school years quite a number of schools did not use ARS for developing anti-truancy measures (13 in 1990 and 11 in 1991, or respectively 45% and 41% of the schools). If a school developed measures to combat truancy on the basis of ARS these measures concerned the resources of the school (e.g. changing absence registration procedures) or general pedagogical measures (e.g. arranging support from external specialists). Schools did not take measures concerning the educational contents or the educational profile of the school (the structure of the school as depicted for instance by the various possible educational streams and student career options). Registrational use proved to be the only form of ARS use that was significantly stronger in 1990-1991 than in 1989-1990. Thus, concerning other forms of ARS use no systematic development was observed between these two school years.

The reduction of absenteeism

To answer the second research question four absence rates have been studied: the percentage of disallowed absence of a school, the percentage of allowed absence, the percentage of truants for 1-2, 3-5, or 6-8 lessons on a specific school day and finally the percentage of students truanting for one or more lessons on a specific school day. These rates have been measured for 1988 (the pretest), 1990 and 1991 for both experimental and control schools. For each rate the differences between control group and experimental group concerning the difference scores (e.g. the percentage of disallowed absence in 1991 minus the same percentage in 1990, or in 1988) have been computed.

Disallowed absence

The disallowed absence difference score 1990-1988 expresses how the disallowed absence rate has developed between these two years. Table 1 shows the results of the Mann-Whitney test of the difference scores of the experimental and of the control group.

Table 1: Results of Mann-Whitney test of disallowed absence rate difference scores T1 - T0, T2 - T1 and T2 - T0; mean rank (= M), Mann-Whitney statistic (= U) and probability that observations from the experimental group exceed observations from the control group (= Prob.)

difference scores	control group (N=17) M	experimental group (N=22) M	U	one-tailed significance of U	Prob.
T1 - T0 (1990-1988)	18.4	21.3	159	.22	.57
T2 - T1 (1991-1990)	20.5	19.6	179	.42	.48
T2 - T0 (1991-1988)	20.4	19.7	180	.43	.48

Table 1 shows that if the T1-T0 difference scores of the control group and experimental group are compared by means of the Mann-Whitney test, the mean rank of the experimental group is higher (21.3) than the mean rank of the control group (18.4). For the T2-T1 and T2-T0 difference scores it is the other way around, the mean rank of the control group is higher.

The probability that a randomly chosen disallowed absence difference score T1-T0 from the experimental group exceeds a randomly chosen disallowed absence difference score T1-T0 from the control group is .57. For the T2-T1 and T2-T0 difference scores this probability is .48, which means that the probability is larger (.52) that a difference score from the control group is higher than the probability that a difference score from the experimental group is higher than a score from the control group.

The disallowed absence difference scores do not differ significantly ($p<.05$) between both research groups. In other words, if both groups are compared with each other, neither in the period 1990-1988, nor in the periods 1991-1990 and 1991-1988 did there prove to be a significant difference between these groups concerning the development of the degree of disallowed absence. This means that experimental schools, when compared with control schools (the latter register absenteeism manually) could not reduce truancy systematically between 1988 and 1991, despite the use of ARS.

Allowed absence

Table 2 depicts the results of the Mann-Whitney test of the allowed absence difference scores. The probability that a randomly chosen allowed absence difference score from the experimental group exceeds a randomly chosen allowed absence difference score from the

control group is .49 (T1-T0), .58 (T2-T1) and .60 (T2-T0) respectively. The comparison of the allowed absence difference scores of the experimental and of the control group show that experimental schools and control schools do not differ significantly ($p<.05$) concerning the way in which allowed absence rates have changed between 1988 and 1991. So, ARS usage did not produce a reduction of allowed absence that schools that do not use ARS did not achieve.

Table 2: Results of Mann-Whitney test of allowed absence rate difference scores T1 - T0, T2 - T0 and T2 - T1; mean rank (= M), Mann-Whitney statistic (= U) and probability that observations from the experimental group exceed observations from the control group (= Prob.).

difference scores	control group (N=17) M	experimental group (N=22) M	U	one-tailed significance of U	Prob.
T1 - T0 (1990-1988)	20.3	19.8	182	.45	.49
T2 - T1 (1991-1990)	18.2	21.4	156	.20	.58
T2 - T0 (1991-1988)	17.8	21.7	149	.15	.60

The percentage of students that plays truant 1-2, 3-5 or 6-8 lessons

A third absence rate that has been determined to analyse trends in absenteeism as a consequence of introducing ARS concerns the average percentage of students that on a specific day plays truant during 1-2, 3-5 or 6-8 lessons. The results of the Mann-Whitney test of the difference scores concerning this measure are presented in table 3.

Table 3: Results of Mann-Whitney test of the difference scores T1 - T0, T2 - T1 and T2 - T0 for the percentage of truants truanting 1-2, 3-5, 6-8 lessons; mean rank (= M), Mann-Whitney statistic (= U) and probability that observations from the experimental group exceed observations from the control group (= Prob.).

difference scores	control group (N=16 or 17) M	experimental group (N=22) M	U	one-tailed significance of U	Prob.
1-2 lessons 1990-1988	17.3	21.3	141.5	.14	.60
1-2 lessons 1991-1990	21.9	16.5	120.0	.07	.35
1-2 lessons 1991-1988	17.8	20.9	149.0	.20	.58
3-5 lessons 1990-1988	20.8	18.4	156.0	.26	.44
3-5 lessons 1991-1990	16.9	20.8	135.0	.15	.60
3-5 lessons 1991-1988	19.6	19.4	176.5	.48	.49
6-8 lessons 1990-1988	21.4	18.0	147.0	.18	.41
6-8 lessons 1991-1990	15.8	21.7	115.0	.05	.66
6-8 lessons 1991-1988	19.8	19.3	174.0	.45	.49

The probability that a randomly chosen observation from the experimental group exceeds a randomly chosen observation from the control group is more often (for five of nine difference scores) smaller than the probability that a random difference score from the control group exceeds a random experimental group difference score. None of the difference scores shows a significant ($p<.05$) decrease or increase in this absence rate. In other words, if ARS schools and control schools are compared with each other, the former did not succeed in reducing significantly the number of students that do not attend 1-2, 3-5, or 6 or more lessons between 1988 and 1991.

The truants ratio

The last computed absenteeism measure is the percentage of students of a school that truants during one or more lessons on a specific day. The analysis of the truants ratio difference scores (see table 4) did not reveal any significant ($p<.05$) differences between experimental and control schools.

Table 4: Results of Mann-Whitney test of the truants ratio difference scores T1 - T0, T2 - T1 and T2 - T0; mean rank (= M), Mann-Whitney statistic (= U) and probability that observations from the experimental group exceed observations from the control group (= Prob.).

difference scores	control group (N=17) M	experimental group (N=22) M	U	one-tailed significance of U	Prob.
T1 - T0 (1990-1988)	17.7	20.8	146.5	.19	.58
T2 - T1 (1991-1990)	21.5	15.8	111.0	.06	.34
T2 - T0 (1991-1988)	18.1	18.0	151.0	.49	.50

In other words, the differences in the decrease (or increase) of the truants ratio between the experimental and the control group are not systematic, they can be interpreted as random fluctuations.

From these results concerning four absence rates it can be concluded that no significant differences concerning the reduction of, or increase in, one of the absence rates have been found. In the discussion section the question of why ARS use did not produce a systematic reduction of one or more of the absence rates in the experimental schools will be addressed. Because of these results some data have been studied additionally in an exploratory way. On the basis of changes in disallowed absenteeism rates project schools were divided into four groups:

1. schools in which disallowed absenteeism increased between 1988-1990 and 1990-1991;
2. schools in which disallowed absenteeism decreased between 1988-1990 and 1990-1991;
3. schools in which disallowed absenteeism increased between 1988-1990, but decreased between 1990-1991;
4. schools in which disallowed absenteeism decreased between 1988-1990, but increased between 1990-1991.

Since the number of schools in each group is small one has to be careful when comparing these groups. The exploration was executed to generate some ideas that can be tested in future studies. Thus these groups were compared to explore the possibility of whether they contrasted with each other concerning the scores on context variables and/or on ARS use.

Unfortunately no unequivocal differences between these groups have been found.

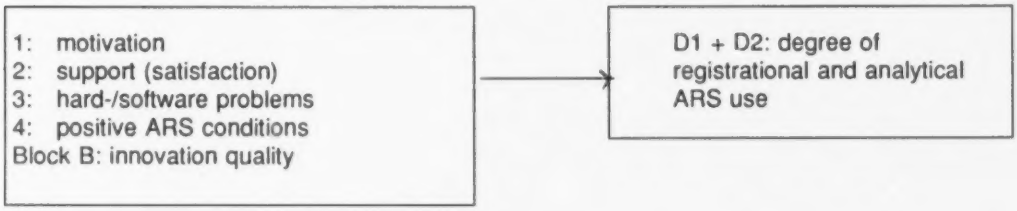
Factors that stimulate ARS implementation

To determine to what extent the quality of ARS, characteristics of the implementation process (the C1-variables in figure 1) and of participating schools (the C2-variables) influence the degree to which ARS is used (the third research question), two stepwise regression analyses have been carried out. Since the relation between the number of variables and the number of cases (27) was unfavourable, the number of independent variables was reduced. This was done by combining variables in compound variables on the basis of their content. This resulted in four compound variables. A compound variable score consists of the sum of the z-scores for each of the variables a compound variable consists of. The number of variables each compound variable consists of differs as a result of which they are not comparable. Therefore compound variables have been standardized (z-scores). The compound variables comprise the following variables:

- compound variable 1, the degree to which school staff is motivated to use ARS (variables C1.1, C1.2, C1.3, C2.1 and C2.2 in figure 1);
- compound variable 2, the degree of support (satisfaction), (variables C1.11, C1.4 and C1.6);
- compound variable 3, the degree to which hardware and software problems with ARS occurred (variables C1.5, C1.12, C1.14);
- compound variable 4, the degree to which a school met positive conditions for ARS use before ARS was implemented (variables C2.5, C2.4, C2.7 and C2.3).

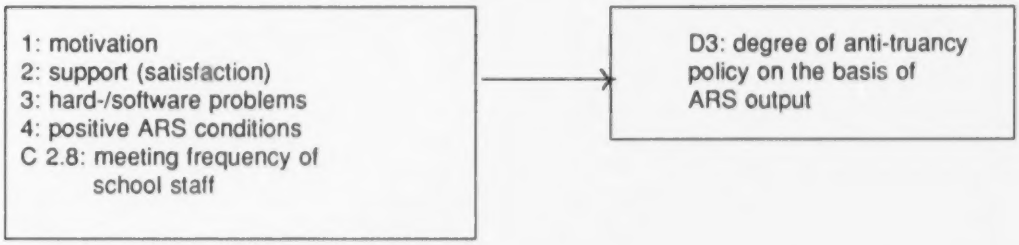
These four compound variables were used as possible predictors in two regression analyses for both 1990 as well as 1991. The dependent variable in the first regression analysis was the total score for registrational and analytical ARS use. In this regression analysis five predictors were involved: the four compound variables mentioned above and variable block B (innovation quality). In figure 2 this regression-model is shown.

Figure 2: Regression model of the degree of registrational and analytical ARS use on implementation influencing factors


1: motivation
2: support (satisfaction)
3: hard-/software problems
4: positive ARS conditions
Block B: innovation quality
D1 + D2: degree of registrational and analytical ARS use

The four compound variables were also involved as predictors in the second regression analysis. The dependent variable of the second regression analysis concerns the degree of anti-truancy policy on the basis of ARS output (D3 in figure 1). Figure 3 shows the second regression model.

Figure 3: Regression model of the degree of anti-truancy policy development on the basis of ARS output on implementation influencing factors


1: motivation
2: support (satisfaction)
3: hard-/software problems
4: positive ARS conditions
C 2.8: meeting frequency of school staff
D3: degree of anti-truancy policy on the basis of ARS output

'Innovation quality', which is the fifth predictor in the first regression analysis has been replaced by the variable 'school staff meeting frequency'. The reason being that it is expected that 'school staff meeting frequency' correlates much stronger with the extent to which ARS is used for the development of an anti-truancy policy, than 'innovation quality' does (the latter probably correlates stronger with registrational and analytical ARS use).

Table 5 contains the results of regression analyses for both 1990 and 1991.

Table 5: Regression analysis of ARS use on implementation influencing variables for 1990 (N=29) and 1991 (N=26); ß-values, standard errors (s.e.) and explained variance ($p < .05$).

Implementation influencing factors	registrational and analytical ARS use				anti-truancy policy based on ARS			
	1990		1991		1990		1991	
	ß	s.e.	ß	s.e.	ß	s.e.	ß	s.e.
Motivation	.66	(.15)						
Support (satisfaction)								
Hard-/software problems								
Positive ARS conditions	.42	(.15)						
Innovation quality								
Meeting frequency school staff								
Explained variance	48%		-		-		-	

For the 1990 data two strong predictors for 'the degree of registrational and analytical ARS use' were found: the degree to which school staff is motivated to use ARS and the extent to which a school meets positive conditions for ARS use before it was implemented. These two predictors together account for 48% of the variance in the degree of registrational and analytical ARS use. 'Motivation' accounts for 31% of the variance and 'positive ARS-conditions' adds 17% to the explained variance. The accompanying ß-values are high, respectively .66 for 'motivation' and .42 for 'ARS-conditions'. Thus, during the first stage of the implementation process (in 1990 ARS schools used ARS for about eight months) the degree to which schools were motivated to use ARS (variable C2.2) and the extent to which they were encouraged by their principal (variable C1.1) to do so proves to be very important. The importance of innovation motivation corresponds with educational innovation literature and literature on introducing computer-assisted information systems (see e.g. Bennet & Lancaster (1986), Piercy (1987)).

The fact that the compound variable 'positive conditions for ARS use' proved to be a second predictor in 1990 implies that schools in that year also differed concerning this. This compound variable consisted of four factors:

- the degree to which schools according to school staff can combat truancy (C2.5);
- the degree to which schools already combated absenteeism before the introduction of ARS (C2.4);
- the degree of student counselling (C2.7);
- the degree to which the school, before ARS was used, already registered and handled absenteeism in a way similar to the ARS procedure (C2.3).

The results of the 1990 analysis imply that the other three compound variables did not explain any variance in ARS use. This is remarkable since it means that in this project neither the quality of ARS, nor the support(satisfaction) of schools, nor the degree to which schools have had to cope with hardware and software problems proved to make any difference to the extent of registrational and analytical ARS use. However, from this finding it should not be concluded that these variables are of no importance for successfully implementing ARS. In a number of cases relations probably could not be found due to there being little variation between schools in the scores on these variables. The latter may be because some variables hardly varied between schools, like the degree of support that schools received and the perception of the innovation quality.

The regression analysis with the dependent variable 'degree of anti-truancy policy' for the 1990-data did not produce any significant results, which is probably linked to the fact that ARS schools hardly developed anti-truancy measures (13 of 29 schools did not develop any policy measure and no school developed more than 3 measures). Thus, there was little variance in the scores on the dependent variable.

The stepwise regression analysis for the 1991 data (the schools had used ARS for about 20 months then) did not yield any significant results. None of the five predictors can be regarded as promoting registrational and analytical ARS use, nor policy-making on the basis of ARS data. Two factors that predicted registrational and analytical ARS use to a high degree in 1990 do not predict registrational and analytical ARS use in 1991 anymore. As mentioned above a possible explanation for this finding might be that these factors are especially important during the first phase of the innovation process.
Another possible explanation may be the fact that there is more variance between schools concerning the sum of registrational and analytical ARS use in 1990 than in 1991. In 1990 the standard deviation is 356.7 (mean = 1177, maximumscore = 1545), in 1991 it is 270.3 (mean = 1245.7, maximumscore = 1570).

The 1991 results concerning ARS use for the development of anti-truancy measures are in keeping with the results of the same analysis for the 1990 data. Just as in 1990 no predictor for 'policy-making ARS use' could be found, which is possibly due to the fact that variance in the score for anti-truancy policy development on the basis of ARS-data was very limited (11 of 27 schools took no, nine schools one, six schools two and one school took 9 policy measures). Variance between schools on this variable therefore is probably not large enough to detect a predictor. The fact that schools did not use ARS intensively for the development of anti-truancy measures probably means that it must be very difficult for them to develop such a policy.

Other effects of ARS

The principal, the school employee responsible for coordinating the implementation of ARS and the ARS operator were asked whether introducing ARS had led to other (positive and/or negative) effects than possible changes in absenteeism rates (the last research question). On the basis of their responses the mean score of every school has been computed for every positive and negative effect.

The positive effects

Table 6 shows to what extent positive effects occurred according to school staff. A percentage represents the portion of schools that perceived an effect as occurring to a certain degree.

Table 6: The degree to which ARS schools perceive positive effects of ARS use in 1990 (N=30) and in 1991 (N=27) in percentages, mean (= M) and ranked according to mean.

positive effects	not at all	small	fair	strong	very strong	M	order of ranking
a. truants are tracked down more	6,7 7,4	20 3,7	56,7 22,2	16,7 48,1	0 18,5	2,8 3,7*	6 5
b. quicker reaction to truancy	0 3,7	10 7,4	46,7 25,9	36,7 44,4	6,7 18,5	3,4 3,7	4 5
c. better insight into truancy figures	0 3,7	3,3 3,7	16,7 11,1	36,7 51,9	43,3 29,6	4,2 4	1 3
d. computing truants for reports means less work	0 3,7	3,3 0	26,7 7,4	23,3 70,4	46,7 18,5	4,1 4	2 3
e. improved registering and handling of absences	0 3,7	10 0	13,3 18,5	56,7 37,0	20 40,7	3,9 4,1	3 2
f. trends in truancy can be better discovered	3,3 0	13,3 0	36,7 0	43,3 77,8	3,3 22,2	3,3 4,2*	5 1
g. registering and handling absences takes less time	10 3,7	56,7 29,6	26,7 37,0	3,3 25,9	3,3 3,7	2,3 3,0*	7 8
h. less complaints from parents concerning truancy	33,3 3,7	60,0 7,4	6,7 63,0	0 18,5	0 7,4	1,7 3,2*	8 7
i. less complaints from the neighbourhood and police	90 3,7	10 22,2	0 66,7	0 7,4	0 0	1,1 2,8*	9 9

* The average score for this item in 1991 is significantly higher than in 1990 (Wilcoxon test; $p < .05$).

Please note: for each effect the first line contains the percentages for 1990, whereas the percentages for 1991 are depicted on the second line. Positive effect a. for example does not occur at all in the opinion of 6,7% of the project schools in 1990, in 1991 this percentage is 7,4.

Having a better insight into truancy figures proves to be the strongest positive effect in 1990, according to 80% of the schools this effect occurred (very) strongly. In 1991 this effect is also very strong but it is then ranked third, because some other effects are perceived as occurring stronger in 1991.

Another effect that seems to occur strongly in 1990 is that computing the number of absences per student for student reports costs less time: on average 70% of schools perceives this

effect as occurring strong or very strong and in the opinion of 26% of schools it occurs to a fair degree. In 1991 this effect is even stronger: about 90% of the schools perceive it as (very) strong. Since one other effect appears even stronger in 1991 this one has moved down to third place in order of ranking.

According to more than 76% of the schools absence registration and handling have improved in 1990 to a (very) strong degree as a result of using ARS. This is approximately the same as for 1991, where it is the second strongest effect.

In 1990 43% of schools think to a (very) strong degree that, as a result of ARS use, they can react more quickly to truancy, among 47% of schools this effect appears to a fair degree. In 1991 the picture is somewhat different: according to 63% of schools this effect occurs (very) strongly, whereas 26% think this effect appears to a fair degree.

The last effect that in 1990 in the opinion of a considerable percentage of schools appears to a (very) strong degree is the improved possibility to discover truancy trends. According to 47% of schools this effect occurs (very) strongly; in the opinion of 37% it appears to a fair degree. In 1991 this effect is even the strongest since it is a (very) strong effect in the opinion of <u>all</u> schools for that year.

Remarkable is that according to 67% of schools in 1991 truants are tracked down more to a (very) strong degree as a result of using ARS, whereas in 1990 this effect only occurs in the opinion of 17% of respondents.

In order to determine the extent to which differences in the scores between 1990 and 1991 are significant, these differences have been tested by means of the Wilcoxon test for matched pairs ($p<.05$). The findings of this test showed that in the perception of school staff, truants are tracked down <u>more</u> in 1991, truancy trends can be determined better, absence registration and handling cost less time and parents and the neighbourhood/police complain less about truancy. The other differences between 1990 and 1991 concerning positive effects of ARS use should be interpreted as random fluctuations.

The negative effects

Table 7 contains the negative effects that in the opinion of schools occur to a certain degree as a result of introducing and using ARS.

Table 7: The degree to which ARS schools perceive negative effects of ARS use in 1990 (N=30) and in 1991 (N=27) in percentages, mean (= M) and ranked according to mean.

negative effects	not at all	small	fair	strong	very strong	M	order of ranking
a. more boring work	36,7 18,5	50 48,1	6,7 22,2	6,7 11,1	0 0	1,8 2,3	3 2
b. ARS output is not used	76,7 18,5	23,3 59,3	0 18,5	0 3,7	0 0	1,2 2,1*	6 6
c. the number of truants of teachers/subjects is analysed more intensely	53,3 14,8	43,3 55,6	3,3 22,2	0 7,4	0 0	1,5 2,2*	4 4
d. uncertainty concerning quality of ARS	23,3 14,8	50 55,6	20 22,2	3,3 3,7	3,3 3,7	2,1 2,3	2 2
e. registering and handling absences means more work	6,7 3,7	46,7 29,6	36,7 48,1	10 11,1	0 7,4	2,5 2,9	1 1
f. those responsible for absence handling feel checked more	76,7 14,8	20 63,0	3,3 14,8	0 7,4	0 0	1,3 2,2*	5 4

* The average score for this item in 1991 is significantly higher than in 1990 (Wilcoxon test; $p < .05$).

Please note: for each effect the first line contains the percentages for 1990, whereas the percentages for 1991 are depicted on the second line. Negative effect a. in 1990 for example does not occur at all in the opinion of 36,7% of the schools, for 1991 this percentage is 18,5.

The general picture is that none of the negative effects is experienced by many schools as occurring to a high degree. The sum of the columns 'strong' and 'very strong' in 1990 varies between 0% and 10%, for 1991 it varies between 3,7% and 18,5%. The percentages for to 'a fair degree' are low too. In both years 'more work for registration and handling' is the strongest negative effect: respectively 36,7% and 48,1% of the schools thinks that this negative effect occurs to a fair degree in 1990 and 1991, while in the opinion of respectively 10% and 18,5% this effect appears (very) strongly. This finding is remarkable since it means that ARS use in the perception of a group of school staff did not cause less, but more work for absence registration and handling. In other words the positive effect 'improvement of absence registration and handling' seems to go hand-in-hand with 'more work for absence

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registration and handling'. Possibly this is due to the fact that more attention is paid to absence registration, which requires more time. Another explanation might be that ARS use requires more time than when absence registration was done manually.
It is satisfying that the other possible, undesired effects of ARS use that are mentioned in table 7 do not appear in most schools to a (very) strong or fair degree.

The following results emerge from the Wilcoxon test of the differences between 1990 and 1991 concerning the negative effects of ARS use. In the perception of school staff three negative effects have increased between 1990 and 1991: non-use of ARS-output, a more intense analysis of the number of truants of teachers/subjects and the fact that those responsible for absence handling feel checked more. Although these effects became stronger between 1990 and 1991, not many school staff perceived them as occurring (very) strongly.

Discussion

First the select character of the research group and the imperfect match of experimental and control schools has to be pointed out again. This means that generalizations of the findings are unjustified and that the results of the comparison of experimental and control schools should be used carefully. The findings of this research project should be considered as assumptions that have to be tested in a larger group of schools.
The most important question is of course why this study did not show that using ARS goes hand-in-hand with a significant reduction in absenteeism.
A number of possible reasons can be mentioned here. Firstly, ARS may not be powerful enough to reduce absenteeism. Petzko (1990) also found in her study of American high schools that technological innovations did not produce lower absenteeism rates.
Secondly the study showed that project schools used ARS for registration to a fairly high degree, but analytical use of ARS and the use of ARS for anti-truancy policy-making was underdeveloped. It might be that if schools had used ARS more intensively in other ways too, absenteeism could have been reduced.
Possibly the period during which ARS was used by schools (20 months) has been too short to enable schools to evolve towards higher levels of analytical and policy supporting ARS use. Perhaps a follow-up study will show that schools that use ARS more intensively (especially for analytical and policy making activities) are more effective in reducing the rate of absenteeism.
Maybe the limited use of ARS for developing anti-truancy measures results from the fact that absenteeism is not regarded as a problem that requires such measures. In other words,

combating absenteeism could be mainly considered as a matter of registering and handling individual truants.

Moreover, the way in which project schools use ARS (especially for registration) may be questioned here. Does ARS use mean that truancy reasons and causes are detected and tackled, or is it just a matter of treatment of symptoms? And to what degree does using ARS imply a change for project schools if they hardly used it in an analytical and policy supporting way? It might be that registering absenteeism by means of ARS and the former manual way of registering absences hardly differ and therefore ARS use did not produce the desired reduction in absenteeism.

Other reasons for the failed reduction in absenteeism might be linked to the selectivity of the research group. Many project schools proved to be schools for (individual) lower vocational education and were small. It might be that especially in these schools it is difficult to reduce absenteeism because of the fact that in those schools it is also controllable without ARS and/or these schools have many students from ethnical minorities who truant regardless because of external factors (e.g. home characteristics). Petzko (1990) has shown that the extent of truancy of a school is determined to a high degree by the number of students from ethnical minorities it has. This may imply that the degree to which schools can influence the extent of absenteeism is limited, especially in such schools. Since the ARS project schools proved to have a considerable number of minority students maybe for this reason absenteeism could not be reduced very much. It could be that possibilities to influence absenteeism lie especially outside schools.

Nevertheless an efficient and reliable ARS type registration remains important and necessary, since it should be the starting point for any activity (inside or outside the school) to reduce absenteeism. Moreover, not every school has an extra sensitive, truancy-prone student population that, regardless of school initiatives truants very often.

Finally, the way in which the magnitude of absenteeism has been measured also plays a role concerning the fact that a reduction of absenteeism rates could not be shown. A different means (during a longer period and at more points in the school year) of measuring absence was impossible since it would have overburdened schools, but maybe would have given different results.

Although project schools hardly used ARS for developing policy measures to reduce absenteeism, its registrational and analytical use proved to be influenced to a high degree by the extent to which schools are motivated to use ARS, as well as by the degree to which they already met a number of positive conditions for its use before ARS was introduced. This finding implies that introducing ARS will not produce the same level of ARS use in every school and moreover if ARS is implemented, substantial attention should be paid to these

factors.

A reduction of absenteeism as a consequence of ARS use could not be shown, but perceptions of school staff are encouraging. ARS users observe many positive ARS effects from which one may expect that these will reduce the extent of absenteeism in the long run; for instance better insight into truancy figures, an improved registering and handling of absences, a quicker reaction to truancy and the fact that truancy trends can be better identified. Moreover, no serious negative effects of ARS use were mentioned by school staff.

A follow-up study for above mentioned reasons would be valuable as it could provide us with more insight into the possibility of combating the problem of student absenteeism by using a system like ARS.

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The Authors

A.J. VISSCHER teaches and conducts research in the Department of Education of the University of Twente, in the Netherlands. He studies the possibilities and impact of computer-assisted management information systems in educational organizations. In cooperation with others he has worked on the development of an integrated school information system for Dutch secondary schools.

K.Tj. BOS is educational researcher in the Centre for Applied Research in Education of the University of Twente, in the Netherlands. At present he studies student counselling in secondary schools and carries out assessment research within the framework of the Third Mathematics and Science Study.